SOME OBSERVATIONS ON THE AQUATIC VASCULAR FLORA OF THE HANCOCK COUNTY, ILLINOIS SECTION OF THE MISSISSIPPI RIVER

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ABSTRACT: The submerged and floating aquatic vascular flora of the Hancock County, Illinois section of the Mississippi River consists of herbaceous plants which occur in two divisions, nine families, 12 genera and 21 species. Most of the species are monocots (85.7%) whereas there are only one fern and two dicot species. Eight (38.1%) of the species are floating and two species (9.5%) are alien. Twelve of the species were not recorded before 1952. This flora is a dynamic and important one which should be continually monitored.

INTRODUCTION

With the establishment of the Western Illinois University Alice L. Kibbe Life Science Station and its herbarium in 1964, a program of studying the aquatic vascular plant flora of the Mississippi River that borders on west-central Illinois was initiated. The first project was to inventory the submerged and floating vascular plants. This paper reports the results of that inventory along Hancock County and some associated observations concerning that flora. Voucher specimens are deposited in the station herbarium (WARK) and family and species nomenclature follows Mohlenbrock (1975).

LIST OF PLANTS
(and their occurrence)

DIVISION POLYPODIOPHYTA
Salviniaceae
Azolla mexicana Presl (occasional and erratic)

DIVISION MAGNOLIOPHYTA
CLASS MAGNOLIOPSIDA
Ceratophyllaceae
Ceratophyllum demersum L. (common)
Nelumbonaceae
Nelumbo lutea (Willd.) Pers. (common)

CLASS LILIOPSIDA
Hydrocharitaceae

Elodea canadensis Michx. (frequent)
Elodea nuttallii (Planch.) St. John (frequent)
Vallisneria americana Michx. (common)
Lemnaceae
Lemma minor L. (common)
Spirodela polyrhiza (L.) Schleiden (common)
Wolffia columbiana Karst. (common)
Wolffia papulifera Thompson (occasional)
Wolffia punctata Griseb. (frequent)
Najadaceae
Najas flexilis (Willd.) Rostk. & Schmidt (frequent)
Najas guadalupensis (Spreng.) Magnus (frequent)
Najas minor All. (occasional)
Pontederiaceae
Zosterella dubia (Jacq.) Small (common)
Potamogetonaceae
Potamogeton crispus L. (common)
Potamogeton foliosus Raf. (occasional)
Potamogeton nodosus Poir. (common)
Potamogeton pectinatus L. (common)
Potamogeton pusillus L. (occasional)
Zannichelliaceae
Zannichellia palustris L. (frequent)

FLORISTIC ANALYSIS

The submerged and floating aquatic vascular flora of the Hancock County, Illinois section of the Mississippi River are herbaceous plants which occur in two divisions, nine families, 12 genera and 21 species. Of the species, one (4.8%) Azolla mexicana, is in the Polypodiophyta and 20 (95.2%) are Magnoliophyta. Within the angiosperms, 18 species (90%) are Liliopsida (monocotyledons) and two (10%) Ceratophyllum demersum and Nelumbo lutea are in the Magnoliopsida (dicotyledons). The monocots represent 85.7% of all the species whereas the dicots compose 9.5%.

Of the nine families in which the species occur, one (11.1%) is a Polypodiophyta and eight (88.9%) are Magnoliophyta. Within the angiosperms, six (75%) are Liliopsida and two (25%) are Magnoliopsida. The monocots represent 66.7% of all the families whereas the dicots compose 22.2%. The largest families are the monocot families Potamogetonaceae (five species), Lemnaceae (five species), Hydrocharitaceae (three species) and Najadaceae (three species). All the rest of the families have only one species each.

Of the 12 genera in which the species occur, one (8.3%) is a Polypodiophyta and eleven (91.7%) are Magnoliophyta. Within the angiosperms, nine (81.8%) are Liliopsida and two (18.2%) are Magnoliopsida. The monocots represent 75% of all the genera whereas the dicots compose 16.7%. The largest genera are the

monocot genera Potamogeton (five species), Najas (three species), Wolffia (three species), and Elodea (two species). All the rest of the genera have only one species each.

Floating species represent 38.1% (eight species) and submerged plants 61.9% (13 species) of the species. Two (9.5%) of the species (both submerged monocots) are old world aliens (Potamogeton crispus which was first recorded in 1966, Najas minor which was first recorded in 1978) which thus seem to have invaded this part of the Mississippi River since 1952 (they were not recorded as occurring in Hancock County by Kibbe (1952)). Although Potamogeton crispus seems to be more widespread presently than Najas minor, both are well established and increasing and thus could be a threat to the native species.

It is of interest to note that Kibbe (1952) who completed an intensive study, survey and summary of the Hancock County flora from 1833 to 1952 did not include twelve of the 21 species found today (some commonly): Elodea canadensis, Elodea nuttallii, Najas flexilis, Najas guadalupensis, Najas minor, Potamogeton crispus, Potamogeton pusillus, Vallisneria americana, Wolffia columbiana, Wolffia papulifera, Zannichellia palustris and Zosterella dubia. Also none of the remaining nine present-day species were documented by Kibbe (1952) as being collected in the Mississippi River before 1921 since she was cited as the collector of them. (Citations to collections made of aquatic vascular plants found in ponds and sloughs /particularly south of Warsaw/ are, of course, omitted from this paper since there is no evidence they were found in the river.) Therefore it appears that the aquatic vascular plants in the river did not receive major attention of the earlier botanical collectors of Hancock County. It is regrettable then that there is not only a lack of earlier documentation of these species and their occurrence and distribution but also that this lack of information includes the river aquatic vascular flora previous to the building of the Keokuk Dam in 1913 so that the effect of the dam on this flora could be more accurately assessed. Perhaps it was this lack of data that prompted Kibbe (1952) to state in her forward that "The Mississippi River is an almost untouched reservoir, containing a wealth of plant and animal life."

Today the most common species are Ceratophyllum demersum, Nelumbo lutea, Vallisneria americana, Lemna minor, Spirodela polyrhiza, Wolffia columbiana, Zosterella dubia, Potamogeton crispus, P. nodosus and P. pectinatus. Most noticeably increasing are Najas spp., Nelumbo lutea (especially along the shoreline between Hamilton and Nauvoo), Potamogeton crispus, Vallisneria americana (particularly in recent sediments in deeper water) and Zosterella dubia. Kibbe (1952) recorded Lemna minor, Spirodela polyrhiza and Ceratophyllum demersum as abundant which they still are. She states that although Potamogeton pectinatus, P. foliosus and P. nodusus are abundant where found they are not widely

distributed; today P. pectinatus and P. nodosus are probably much more widely distributed as well as abundant. Kibbe (1952) mentioned the occasional occurrence of Azolla mexicana and today that erratic distribution seems the same. The establishment of Nelumbo along the northern part of the county shoreline that she mentions is still valid although, as mentioned before, it is spreading towards Hamilton rapidly. Although Wolffia punctata seems to be today about the same as Kibbe (1952) noted (not often found but abundant where found), Wolffia columbiana which she did not mention is today common.

DISCUSSION AND SUMMARY

Hancock County has a Mississippi River waterfront of 42 miles with a land contact of 72 miles (Kibbe 1952). In 1913 at about the midway of the county shoreline a navigational-power plant dam was built across the river from Keokuk, Iowa to Hamilton, Illinois. In effect, this divided the river along this shoreline into two different aspects so that north of the dam is a slower flowing lacustrine system whereas below (south of) the dam it is a more rapid flowing riverine system. Thus the best and most extensive development of the submerged and floating aquatic vascular plants are north of the Keokuk dam where during time there has been a general increase in sedimentation and changing shorelines and backwaters of the river. An example of a changed shoreline is the large bend of the river at the southern edge of Nauvoo which around 20 years ago was a shallow water area completely covered with Nelumbo whereas today there is forming near the center of this area a wooded (much Salix) island with a slew at the rivers margin. Besides in the larger bends of the river, increased sedimentation has been noticeably occurring at the mouths of tributaries, between islands near and in coves of the shoreline and behind the dam. As a result there are more favorable growing conditions such as reduced current and wave action (the wing dams south of the Keokuk dam also increase the current there), less water-level fluctuations, a more stable substrate (which consists of a high amount of mud and silt), less substrate washing, eroding and scouring, and less turbid water. Perhaps this increasing lacustrine habitat accounts for relatively large number of species recorded for this study area since 1952 as well as the increasing distribution of species (Nelumbo lutea for example).

I would like to rectify an inadvertent omission concerning the Hancock County Mississippi River flora in Henry (1977) where on p. 427 it states that only Lemna minor and Ceratophyllum demersum were found in the river. Wolffia punctata, W. columbiana, Spirodela polyrhiza and Potamogeton pectinatus were also found in the river there. Probably in the river there are other species of Lemna besides L. minor which will be found upon careful examination of Lemna collections.

This aquatic vascular flora is dynamic in that the species composition, diversity, distribution and amount is constantly changing. The yearly seasonal waxing and waning of this plant biomass is spectacular. This flora merits continued floristic monitoring including studies on its phenology and all aspects of its ecology. The importance of these photosynthetic plants to the well being of the ecosystem of which they are part including food, substrate and shelter for invertebrate, vertebrate, micro-organismal and other wildlife, mineral and nutrient recycling, chemical and physical effects as well as just being a part of our environment warrants their protection and preservation. The aesthetic as well as the potential usefulness of them to man's livelihood must also be considered. Most of the threats to this vegetation is due to man such as various types of pollution, effect of barge and other navigational operations, recreational and housing activities, hunting and fishing disturbances, dredging, etc. As noted previously, the threat of alien plants (and perhaps animals) that are now starting to invade and spread must be addressed. Perhaps the most challenging, and maybe frustrating, aspect of working with this river system is dealing with an area that is a multiple-usage one (i.e. recreation, navigation, aesthetics, etc.). Wise management (along with appropriate mitigation efforts) is a must for maintaining the integrity of this ecosystem.

LITERATURE CITED

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